

# Universe of Sensors

## 9 Predictions for 2021

INSIGHTS FOR SUCCESS | IDEAS TO EXECUTE

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January 2021

### 1. HIGH GROWTH MARKET

Sensors are in growth phase of its life cycle. It is relatively easy for new entrants as level of competition is low to moderate. Most of the growth is estimated to take place in applied and emerging sensor class. Sensors market is likely to add \$58.6 billion to its revenue between 2020 -2023 thereby providing large growth opportunities to existing market players and new entrants.

## By 2023

THE GLOBAL SENSOR MARKET REVENUE IS ESTIMATED TO CONTRIBUTE

**\$227.8 billion**



### 3. IOT STRONGLY DRIVES GROWTH TO WIDEN CONNECTED DEVICE ECOSYSTEM

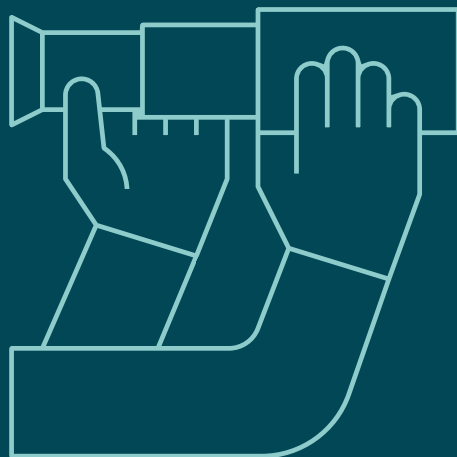
Increasing sensor compatibility with IoT platform is gradually becoming a pre-requisite enabling remote monitoring and control. The IoT connected devices has opened massive opportunities for sensors in almost every application.

THE NUMBER OF CONNECTED DEVICES IS ESTIMATED TO GROW FROM

**16.5 billion to reach 21.5 billion**  
connected devices  
**by 2025**



TOP  
**9**



PREDICTIONS

**OF 2021**

### 2. CHANGING PARADIGM WITH AI

Sensors embedded with artificial intelligence have enabled them to think and interact like humans. AI facilitates real-time control and auto course correction to maintain system integrity, high precision, and system robustness. It enables machines to proactively control any deviations. AI delivers intelligent solutions in automation systems, predictive controls, CRM systems, high resolution imaging applications to name a few.



AI IMPARTS ANALYTICAL CAPABILITY TO SENSORS TO TAKE CORRECT DECISIONS IN REAL TIME,

**enables resource optimisation, eliminates losses due to wastage, and ensures zero down time.**

#### 4. COVID-19 CREATES NEW GROWTH OPPORTUNITIES

COVID-19, SARS virus Family, Ebola and other virus detection is likely to give a big flip to the growth of biosensors. Development of PCR based biosensor testing kit for COVID, rapid detection antibody test and home diagnostic biosensing detection kit for COVID are likely to open new revenue stream for sensors. Development of rapid detection for Ebola based on surface acoustic biosensor addresses an unmet need. Exponential growth is expected for both these categories.

THE GLOBAL COVID-19 DETECTION DEVICE MARKET SIZE IS VALUED AT

**USD 3.25 billion in 2020**



#### 5. DIGITAL IO-LINK

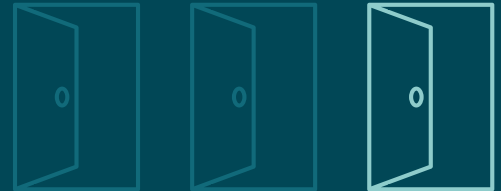


DEVELOPMENT OF IO-LINK DIGITAL CONNECTIVITY ENABLES INFORMATION FROM SENSORS TO BE TRANSFERRED DIRECTLY INTO THE IOT INTERFACE AND PLCs.

IO-Link technology is likely to drive down the system and operational costs appreciably. It enables access to data from lowest field sensors that help manufacturing process optimization. IO-Link device can be an intelligent sensor or an actuator, a hub or a device. IO-Link is a short distance, bi-directional, digital, point-to-point, wired or wireless, industrial communications networking based on IEC-61131-9, IEC 60947-5-2 standards. It facilitates connection to digital sensors/actuators to different types of industrial fieldbuses.

#### 6. SENSING TO SENSE MAKING

Sensors are growing rapidly with strong proliferation into every vertical market application. Yokogawa developed a new range of sensors called "Sense Making Sensors" for process (continuous and batch) applications to maintain process integrity and ensure zero down time. Research has confirmed that little over 5-15% data generated by manufacturing plants is useful. The data generated currently provides inadequate data insights to enable creation of value. By combining intelligent sensors and wireless devices with advanced data analytics can provide actionable insights. This facilitates making informed decisions and drive efficiency. This enables to make actual changes in business.



THIS SHIFT FROM MERE SENSING TO SENSE MAKING IS EXPECTED TO LEAD TO COMPLETE SENSOR DIGITALIZATION THEREBY.

**open large opportunities for sensor manufacturers**



## 7. INNOVATION DRIVEN R&D INVESTMENT

With large investments flowing into R&D, innovation is an integral part of sensors with over 56 emerging sensors/gauges/meters developed in the past few years. These emerging sensors are expected to grow strongly at 18.4% CAGR till 2023. Samsung Electronics announced in late 2019 a plan to invest \$100 billion for sensor development to tap the lucrative global sensor market. Samsung in early 2020 developed first 108MP sensor in the market for smartphone applications. Similarly, recently Sony invested to develop a new 64MP 0.8um sensor. Companies like Honeywell, Emerson, Yokogawa, TE, First Sensor (TE) GE, Baker Hughes GE, Endress+Hauser, iEE, Omron, ST Microelectronics make large investments from 3-10% of their annual revenue to develop game-changing sensors and technologies. Many sensor manufacturers partner with R&D companies like Fraunhofer to develop innovative sensors.



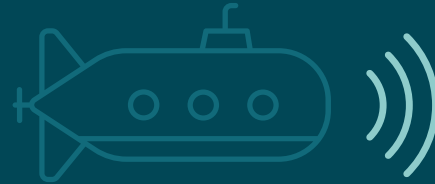
THE QUANTUM LEAP IN INVESTMENTS IN SENSOR UPGRADATION AND DEVELOPMENT IS LIKELY TO

**cause an explosive growth in this decade.**



## 8. ACOUSTICS, A SINGLE TECHNOLOGY PLATFORM ADDRESSES MULTIPLE UNMET NEEDS

Acoustics, an inexpensive technology is at the forefront to address unmet needs. In September 2020 rapid Ebola detection biosensor was developed by Sensor Kinesis that eliminates enriching sample thereby reducing test time drastically to just under an hour. R& D efforts recently were successful to address number of sub-sea and oceanographic applications using acoustic technology platform. **Underwater acoustic sensor systems and sensor networks was designed to enable applications for oceanographic statistics collection, pollution monitoring, offshore exploration, disaster prevention, assisted navigation and tactical surveillance applications.**



## 9. EXPONENTIAL DEMAND FOR INFRARED TEMPERATURE SENSORS

Temperature check at the point of entry to any establishment became the hallmark of COVID-19 detection for both symptomatic and asymptomatic humans. Temperature check using non-contact temperature meter, like infrared temperature gun, became most important part of CDC and public health authorities' guidelines. Hand-held non-contact infrared (IR) forehead thermometers have experienced sudden exponential demand as tools for measuring body temperature as part of COVID-19 related mitigation measures, due to their rapid, non-invasive, and hygienic approach to preventive health monitoring.



ESTIMATES INDICATE AT LEAST

**300% increase**

sales of IR thermometers in 2020 alone.

## Introduction

Sensors are key enablers paradigm change in industrial, commercial, consumer and service industries. They facilitate high precision and ensure high reliability. Sensors are both smart and intelligent. This has accelerated sensor proliferation into different applications across diverse end-users. Sensors have a large installed base across all vertical markets. In the industrial space sensors are widely deployed for monitoring and control applications. The key difference is in:

- Sensing
- Monitoring
- Diagnostics
- Control
- Actuating Corrective Action/ Course Correction

Most sensors are connected. Adoption of IOT platform has accelerated connectivity of devices.




**By end of 2020 installed base of connected devices is calculated to be 16.5 billion and estimated to increase to 19.3 billion in 2023 further likely to reach 21.5 billion by 2025. It has enabled real-time monitoring, control, and corrective action by sensors.**



# Market Matrix

Chart 2.6: Total Global Applied Sensors, Revenue Share by Product Type, US\$mill 2020

Parameters	Measurement	Trend
Market size (2020)	\$169 billion	Up
Market size (2023)	\$227 billion	Up
CAGR (2020-2023)	10.40%	Up
Life cycle	Growth stage	Stable
Product development/Innovation timeline	1-2 years	Up
Key end user industries	Automotive, industrial, oil & gas, healthcare, F&B, power generation, aerospace, water & wastewater, smart buildings	Up
Rate of technological development	Medium to high	Up
Competitive intensity	Low to medium	Up
Price sensitivity	Low to medium	Up
Number of competitors	370+	Up
System platforms	Stand alone to integrated	Up
Broad technology platforms	Contact and non-contact	Up
Replacement rate	5-7 years	Stable
Key transformation	AI embedded, software reliant, IOT, IO link	Down

 Up  
  Stable  
  Down

# Sensors find use in new and diverse application areas



Technology innovations have led to sensors becoming interactive. It has facilitated effective communication in an integrated environment. Interactive and intelligent sensors ensure process integrity, input resource optimization, zero down-time, improved asset utilization and ensure safety in both process and discrete applications.




With proven success of effective decision making by sensors, the use of artificial intelligence is finding higher acceptance in diverse applications. The fear of

human challenge may be true as machines are getting much more intelligent and smart ushering in the next industrial technology revolution. Developments in machine learning and creation of artificial intelligence are rapidly changing the industrial paradigm. These trends have resulted in higher penetration of sensors into diverse applications. The tables below show the recently commercialized sensor used cases in the last 18 months.

## Recently commercialized sensor used cases, 2018-2020

Global Sensors Market: Recently Commercialised Sensors, 2020

<p><b>Life Sciences</b></p> 	<p>Biomedical</p> <p>Medical/Biomonitoring</p> <p>Research sensing</p>	<ul style="list-style-type: none"> <li>• Acoustic based Ebola rapid detection</li> <li>• Rapid antibody COVID detection</li> <li>• Ultra-miniature ingestible camera (Digestive tract &amp; colon cancer detection)</li> <li>• Wireless knee sensing</li> <li>• Remote patient monitoring</li> <li>• Hearing cries for help</li> <li>• Pathogens to keep the hospitals clean</li> <li>• Sensing bitterness</li> </ul>
<p><b>Industrial</b></p> 	<p>Manufacturing</p> <p>Subsea: acoustic</p> <p>Processing</p> <p>Welding</p>	<ul style="list-style-type: none"> <li>• Pickup bad vibrations</li> <li>• Optical displacement measurements</li> <li>• Sensors for pollution monitoring, offshore exploration, disaster prevention</li> <li>• Clean room HVAC</li> <li>• Total wireless approach</li> <li>• Underwater welder</li> <li>• Maintaining weld quality</li> <li>• Pressure for wave pressure</li> <li>• White LED for packaging</li> </ul>

<p><b>Defense</b></p> 	<p>Aerospace</p> <p>Military</p> <p>Security</p>	<ul style="list-style-type: none"> <li>• Six sensors in one</li> <li>• Self-powered sensors</li> <li>• Eliminating friendly fire</li> <li>• Low maintenance wind sensor</li> <li>• Reducing false alarms</li> <li>• Amphibious nose</li> </ul>
<p><b>Automotive</b></p> 	<p>Biomedical</p> <p>Rollover prevention</p> <p>Air conditioning</p>	<ul style="list-style-type: none"> <li>• Touch based alcohol detection sensor</li> <li>• Tomographic sensor for pedestrian detection</li> <li>• Alert drivers</li> <li>• Skid assistance</li> <li>• High-speed External Cavity Diode Laser (ECDL)</li> <li>• Efficient AC</li> <li>• Cabin comfort</li> <li>• Clean air</li> </ul>
<p><b>Security</b></p> 	<p>Smart buildings</p> <p>Subsea: acoustic</p> <p>Home security &amp; radiation detection</p>	<ul style="list-style-type: none"> <li>• Monitoring &amp; spotting structural damages</li> <li>• Emergency communications</li> <li>• Intelligent CCD camera</li> <li>• Sensors for assisted navigation and tactical surveillance applications</li> <li>• Mobile detection</li> <li>• Tagging threats</li> <li>• Objects tracking</li> </ul>

Source: Twimbit



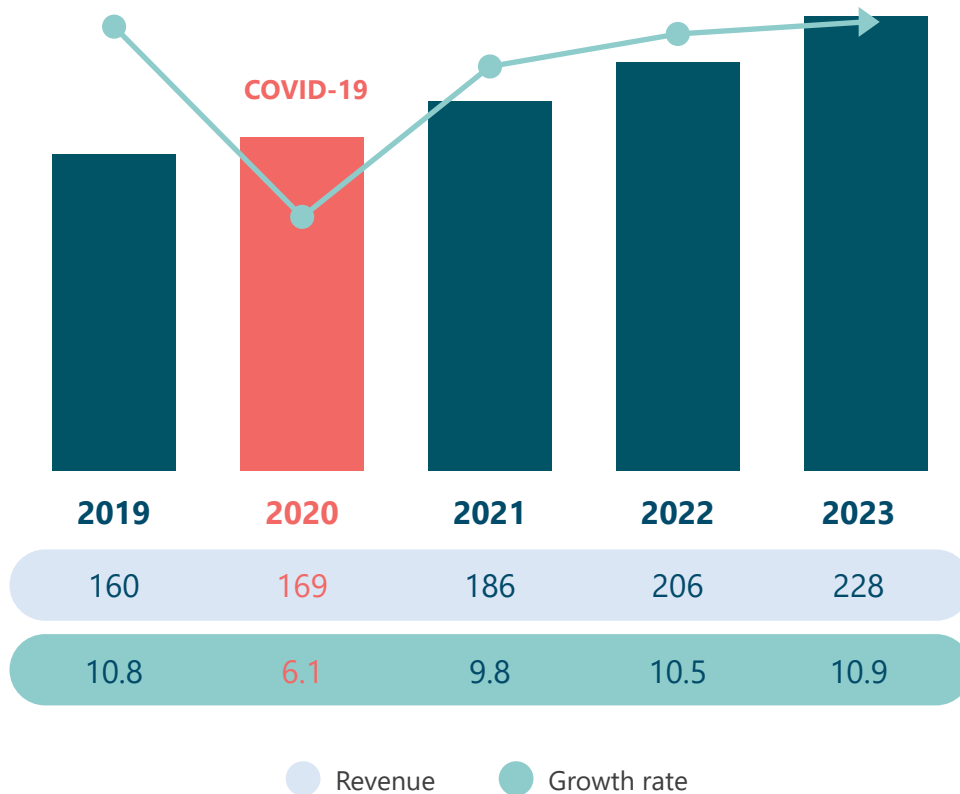
# Total Global Revenue Analysis- Forecasts to 2023

Sensors are in the growth stage of its life cycle. In 2020 sensor growth rate exhibited a decline as the demand dropped from many end-user industries due to impact of COVID-19. At the same time there were other end-user industries that consumed more sensors during this period.

In 2020 the global sensors market generated \$169,296.2 million. Revenue grew at a much lower annual growth rate of 6.1% in 2020 compared to 12.7% in 2019. Large investments are made to develop new sensors and modify the existing sensors to meet the changing needs of end-users.

## Recently commercialized sensor used cases, 2018-2020

Global Sensors Market: Recently Commercialised Sensors, 2020



instrument and system levels. Energy harvesters and safety will aid wireless growth. Both wireless sensors and wired sensors are aiding increased connectivity

through IoT platform. Many industrial facilities are connected to IoT for monitoring at the system level and others are expected to follow.

## COVID-19 Impact – COVID-19 impact on the sensor industry

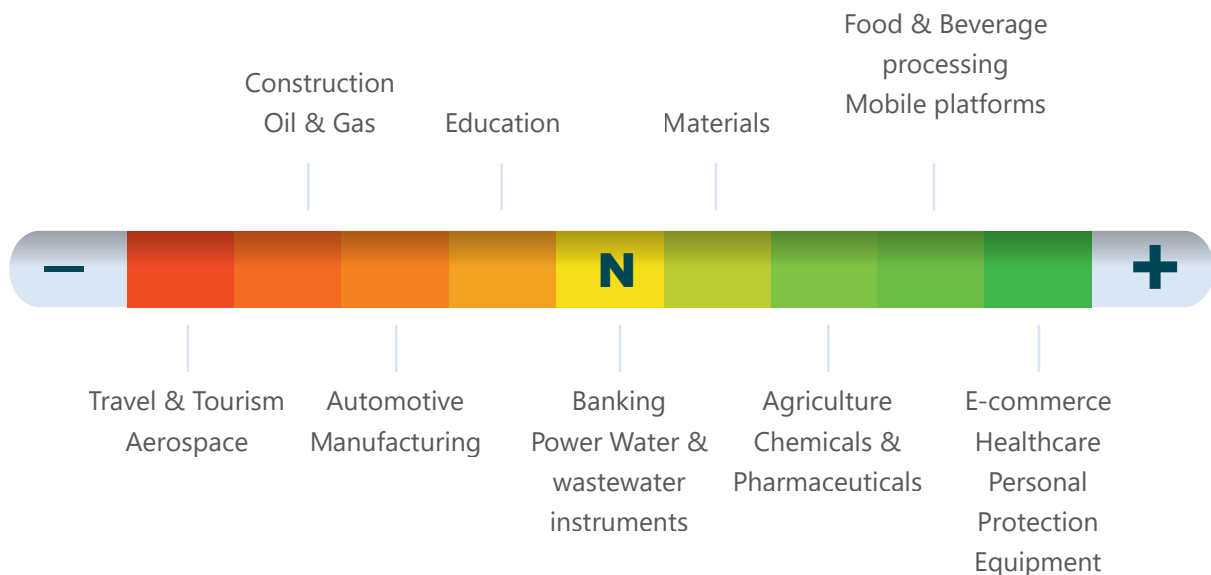
COVID had a mixed impact on various industrial sectors. The vertical markets that took a severe hit in consumption of sensors include manufacturing, industrial process control, Oil & gas, construction, aerospace and automotive.

At the same time there are some of the vertical markets that benefited in a big way during COVID

like e-commerce, information technology, mobile platform, personal protection equipment, health-care (both point of care and home diagnostics), food processing and beverages chemicals and agriculture. While as banking, water & wastewater instruments and energy were stable or best impacted positively but marginally.

### Global Sensors Market: Impact of COVID-19 by End-user Market, 2020

Impact of COVID-19 on Key End-user and implications



Source: Twimbit



Insights **that find you**

### How we think

Our aim is to produce exponential impact for every business and career through the power of research. We understand the industry to know that the way research is produced, personalized and consumed needs to change. We are the catalysts to bring a fresh and new perspective to you.

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